

FACT SHEET

This fact sheet is a companion document to the draft National Discharge Elimination System (NPDES) Permit No. WA-000178-3. The Department of Ecology (the Department) is authorized to issue wastewater discharge permits in compliance with provisions of the Federal Water Pollution Control Act and chapter 90.48 RCW. This fact sheet describes the nature of the proposed discharge and explains the regulatory and technical bases for the conditions of the accompanying permit which allows discharge of treated wastewater to waters of the State of Washington.

Public involvement information is contained in **Appendix A**. Definitions are included in **Appendix B**. Technical calculations are shown in **Appendix C**.

Prior to the public notice and comment period, the Permittee reviews the draft permit and fact sheet for verification of facts. Only factual items are corrected at this time. A response to substantive comments will be completed at the end of the comment period and appended to this fact sheet in **Appendix J**.

GENERAL INFORMATION

<u>Applicant:</u>	U.S. Oil & Refining Co.	<u>Outfall 001(Lincoln Ave. Tidal Gate)</u> Latitude: 47° 15' 52" N Longitude: 122° 22' 38" W
		<u>Outfall 001- A (Compositor)</u> <u>Outfall 001- B (Clean Water Discharge):</u> Latitude: 47° 15' 29" N Longitude: 122° 23' 38" W
		<u>Outfall 002 (NW Tank # 80018):</u> Latitude: 47° 15' 27" N Longitude: 122° 24' 06" W
<u>Facility Address:</u>	3001 Marshall Avenue Tacoma, Washington 98421	<u>Outfall 003 (Marine Terminal Basin):</u> Latitude: 47° 15' 53" N Longitude: 122° 23' 53" W
<u>Type of Facility:</u>	Petroleum Refinery Topping Subcatagory	<u>SIC Code:</u> 2911
<u>Discharge Location:</u>	Blair Waterway (Outfall 001) Ground water (Outfall 003) Lincoln Avenue Ditch (Outfall 002)	<u>Water Body ID Number:</u> WA-10-0020

The refinery is located just north of the Interstate 5 corridor in the Port of Tacoma industrial area and within the city limits of Tacoma. The refinery's treated effluent is discharged into Outfall 001. The effluent from this outfall is combined with stormwater discharges from several nearby

industrial facilities into a common conveyance system prior to discharge into the Lincoln Ave. Ditch. This ditch then empties through a tidal gate into the Blair Waterway (Outfall 001), which empties into Commencement Bay. At the Marine Terminal, stormwater from the tank containment area that has been treated in an oil separation vault is discharged to an infiltration basin for release to groundwater (Outfall 003). Clean water discharges can also be made at Outfall 001- B, Outfall 002 located in an area Northwest of Tank # 80018, and Outfall 003.

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INTRODUCTION

The Federal Clean Water Act (FCWA, 1972, and later modifications, 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System of permits (NPDES permits), which is administered by the Environmental Protection Agency (EPA). The EPA has delegated responsibility to administer the NPDES permit program to the State of Washington on the basis of Chapter 90.48 RCW which defines the Department of Ecology's authority and obligations in administering the wastewater discharge permit program.

The regulations adopted by the State include procedures for issuing permits (Chapter 173-220 WAC), water quality criteria for surface and ground waters (Chapters 173-201A and 200 WAC), and sediment management standards (Chapter 173-204 WAC). These regulations require that a permit be issued before discharge of wastewater to water of the state is allowed. The regulations also establish the basis for effluent limitations and other requirements which are to be included in the permit. One of the requirements (WAC 173-220-060) for issuing a permit under the NPDES permit program is the preparation of a draft permit and an accompanying fact sheet. Public notice of the availability of the draft permit is required at least thirty days before the permit is issued (WAC 173-220-050). The fact sheet and draft permit are available for review (see Appendix A Public Involvement of the fact sheet for more detail on the Public Notice procedures).

The fact sheet and draft permit have been reviewed by the Permittee. Errors and omissions identified in the review have been corrected before going to public notice. After the public comment period has closed, the Department will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the file on the permit and parties submitting comments will receive a copy of the Department's response. The fact sheet will not be revised. Comments and the resultant changes to the permit will be summarized in the Response to Comments that will be issued with the final permit.

BACKGROUND INFORMATION

DESCRIPTION OF THE FACILITY

Industrial Process

The U.S. Oil refinery was constructed in 1957 from units of a old Spokane, Washington topping refinery and consists of two parts: the refinery and tank farm, and the Marine Terminal. The refinery houses the process units and the tank farm with it's 2 million barrel capacity on 122 acres. Approximately 3/4 mile northeast and on the Blair Waterway is the marine terminal, where crude oil arrives and products are shipped out from the two piers. Five pipelines ranging in diameter from 8 to 16 inches transmit crude and products from the marine terminal and the tank farm. Product is also loaded onto tanker trucks from the loading rack at the refinery, and can also be shipped via rail lines.

The facility has the capacity to process 43,500 bbls/calendar day of crude oil (Note: bbls means barrels, the most common measure of oil volume used in the U.S. One barrel equals 42

gallons). The highest daily average throughput for any one month was 36,015 bbls/calendar day for the month of August 1998. From August 1990 through September of 1999 the average daily throughput of crude oil was 29,179 bbls/calendar day. During this same period the highest average throughput for any consecutive 12 month period (10/97-9/98) was 33,422 bbls per calendar day. The U.S. Oil refinery does not operate its crude units every day of the month. As a result the monthly average barrels per stream day is different than the average barrels per calendar day. The highest average throughput for any consecutive 12 month period (12/97-11/98) based on stream days is 37,220 bbls/stream day. (Note: bbls/calendar day means that the throughput is averaged over all of the days of a month; bbls/stream-day means that throughput is averaged over only those days of the month that the crude units of the refinery are operating. These values are the same if the refinery is in operation for every day of the month, but can differ significantly if the crude units are shut down for some period of days in a month.)

The main source of crude oil is from tankers delivering oil from Alaska's Prudhoe Bay oil field. The refinery separates crude oil into its various component parts. Separated components are further processed and blended into a variety of petroleum products. Those products include gasoline, jet fuel, diesel fuel, marine fuel, gas oils, and emulsified and road asphalt. The refinery employs about 160 people.

Discharge Outfalls

All process water and treated contaminated stormwater at the refinery site is discharged via a outfall pipeline that empties into the Lincoln Avenue ditch. Several industries in the area also use the outfall pipeline to discharge stormwater. During dry weather conditions, the discharge from U.S. Oil comprises the majority of the flow in the ditch. The Lincoln Avenue Ditch is an open conveyance upstream of the cofferdam where U.S. Oil's outfall ends, and continues as an open ditch for approximately 300 feet. At this point the flow in the ditch enters a closed culvert, and remains in a culvert until it is discharged through a tide gate to the Blair Waterway. The Blair Waterway is a part of Commencement Bay. This Permit directs USOR to engineer and construct a new outfall line from the wastewater treatment plant to the Blair Waterway.

Process water and contaminated stormwater from the refinery receive primary and secondary treatment in a wastewater treatment system prior to being discharged to the Lincoln Ave. Ditch. Oil and solids removal is achieved in the primary wastewater treatment system, which consists of an API oil/water separator followed by an Induced Air Flotation (IAF) unit. Effluent from the primary wastewater treatment system is then treated in the secondary wastewater treatment system, which consists of an equalization tank, an activated sludge unit (Orbal), and a secondary clarifier. Sanitary waste is collected and discharged separately into the City of Tacoma sewer system for treatment in their municipal wastewater treatment plant. All other stormwater from the refinery site is sent to a concrete-lined basin for oil skimming, and is then pumped to a stormwater retention pond prior to being transferred to the Orbal for secondary treatment. Waste activated sludge from the secondary clarifier is treated in an aerobic digester, then is dewatered and discharged to a concrete-lined pit. Leachate from the pit is returned to the aerobic digester.

The average discharge is 0.410 million gallons per day. The highest daily discharge since March of 1990 was 1.211 million gallons per day which occurred in February of 1992. These very high peak flows occur when the City of Tacoma stormwater ditch in Marshall Avenue overflows it's banks and water runs onto the refinery property from the street. Once the water enters the refinery property it must be treated since it may have come into contact with petroleum-bearing materials. The dry weather flow discharge from the refinery is 331,200 gallons per day.

Stormwater from the Marine Terminal tank containment area is handled two ways. Areas with the highest likelihood of generating contaminated stormwater, such as pump pads or valve pads, drain to sumps which are emptied by vacuum trucks. The trucks return the stormwater to the refinery for treatment. Stormwater from the floor of the containment area drains to a vault, where any oil present can be retained by baffles in the vault. The water in the vault is then pumped to an infiltration basin for release to groundwater. This location is identified as Outfall 003.

Clean water discharges, such as hydrotest water from newly cleaned storage tanks or fire system test water, can be discharged from a hydrant located near the Lincoln Avenue Ditch on the northwest side of the refinery tank farm, a concrete box located next to the outfall 001 compositor or at the Marine Terminal into the Blair Waterway. The hydrant location near Tank # 80018 is identified as Outfall 002 and the concrete box is identified as Outfall 001-B. The Marine Terminal has a dry fire suppression system. This system is checked yearly and clean water from the test will enter the Blair Waterway. The system is connected to the Tacoma water system using a dedicated fire water pipeline.

PERMIT STATUS

The previous permit for this facility was issued on August 15, 1990. The permit was amended as a result of a permit appeal on May 28, 1993 to remove the requirement for a outfall pipeline to either the Lincoln Avenue ditch or to a deep water outfall. The previous permit placed effluent limitations for the first and second tiers on the following parameters tabulated below. The second tier was established to address increased production as a new desalter for the heavy crude unit was to come on-line. Outfall 001 was subject to the Tier 2 limitations August 21, 1990.

EFFLUENT LIMITATIONS FROM 1990 PERMIT (Pounds per day)

Parameters	Tier 1		Tier 2	
	Monthly Average ^a	Daily Maximum	Monthly Average	Daily Maximum
Biochemical Oxygen Demand (5-day) ^b	110	210	120	230
Chemical Oxygen Demand ^b	550	1070	600	1170
Total Suspended Solids ^b	95	150	100	160
Oil and Grease ^{b,c}	35	65	37	70
Phenolic Compounds	0.4 ^d	1.6 ^d	0.5 ^d	1.8 ^d
Ammonia as N	12	26	14	30
Sulfide	0.6	1.4	0.7	2.7
Total Chromium ^b	0.6	1.6	0.7	1.9
Hexavalent Chromium ^b	0.04	0.1	0.05	0.1
pH ^e	Within the range of 6.0 to 9.0			
Flow (MGD)				

Parameters	Tier 1		Tier 2	
	Monthly Average ^a	Daily Maximum	Monthly Average	Daily Maximum
Feedstock Rate (bbls/calendar day)				

- a The monthly average is defined as the average of the measured values obtained over a calendar month's time. The daily maximum is defined as the highest recorded daily value for the same monthly period.
- b Additional allocation is permitted for stormwater runoff.
- c The concentration of oil and grease in the total discharge through Outfall No. 001 shall at no time exceed 15 mg/l, and shall not exceed 10 mg/l more than three days per month.
- d Based upon previous permit limitation using best practicable technology (BPT) because BPT is more stringent than BAT.
- e Indicates the range of permitted values. Excursions between 5.0 to 6.0 and 9.0 to 10.0 shall not be considered violations provided no single excursion exceeds 60 minutes in length and total excursions do not exceed 7 hours and 30 minutes per month. Any excursion below 5.0 or above 10.0 shall be considered violations. The instantaneous maximum and minimum pH shall be reported monthly.

SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT

A compliance inspection with sampling was completed on May 2, 2001. This inspection included sampling of the discharge and laboratory review. No deficiencies were noted in the inspection.

During the history of this permit term, the Permittee has generally remained in compliance based on Discharge Monitoring Reports (DMRs) submitted to the Department and inspections conducted by the Department. The daily maximum limit for Total Suspended Solids was exceeded by 12.5% on August 7, 1993, for which U.S. Oil was fined \$500. A summary of discharge monitoring data is included in **Appendix D**. The Permittee was fined \$3,500 on August 21, 1997 for failure to conduct biomonitoring from 9/95 to 9/97. U.S. Oil had a contract with a laboratory, Parametrix, to collect effluent samples and conduct bioassays. A misunderstanding arose between U.S. Oil and Parametrix on another aspect of their contract, which caused U.S. Oil to suspend that portion of the contract. Parametrix assumed that the whole contract was cancelled and did not conduct the studies. A total of 10 bioassays were not conducted. U.S. Oil discovered the error during an internal audit of NPDES records.

The previous permit required a number of special studies to be completed during the term of the permit. Studies of the effluent included: a cyanide and metals study, a dioxin and furan study, an acute biomonitoring study, a chronic biomonitoring study, and chemical analysis of the influent and effluent. A sediment monitoring study consisted of a chemical analysis of the sediment both upstream and downstream of the common outfall to the Lincoln Avenue ditch. All of these studies were completed as required by the NPDES permit and are discussed later in this document.

The original permit included a dilution ratio study and sediment study for a deep water outfall, but these requirements were removed as a result of the permit appeal. The appeal was successful because Ecology too narrowly defined how U.S. Oil could achieve compliance with the surface water quality standards. The permit was modified as a result of the appeal, and required U.S. Oil to initiate treatment technology, best management practices (BMPs), or waste recycling/reduction to reduce metals of concern in their effluent discharge. U.S. Oil had to demonstrate that these measures would bring the discharge into compliance with the surface water quality standards by June 15, 1995. The permit also required that if the BMPs did not bring U.S. Oil into compliance with the surface water quality standards, then U.S. Oil was to submit a schedule of compliance detailing the steps for construction of a deep water outfall by July 15, 1997.

U.S. Oil has investigated sources of metals in the refinery which could be impacting the wastewater. They also initiated considerable testing of the effluent using ultra-clean sampling and analysis techniques, which were not widely available when the permit was modified. This testing gave a more accurate assessment of the effluent, indicating that the concentrations of metals were lower than was previously thought. Ecology has also re-evaluated the discharge, and has determined that the receiving water body to be protected is the Blair Waterway, a marine waterbody, rather than the Lincoln Ave. Ditch. Options other than the ones outlined in the permit have possibilities for achieving compliance as well. Ecology agreed to address this issue with a compliance schedule in the NPDES permit renewal and would not obligate U.S. Oil to submit a schedule of compliance for the deep water outfall option as required by their existing permit.

WASTEWATER CHARACTERIZATION

An application for permit renewal was submitted to the Department on August 16, 1994. Three revisions to the permit application were submitted, dated February 9, 1995, March 17, 1995, and January 15, 1999 to clarify and update production numbers for the individual units in the process train, and to provide information about Marine Terminal stormwater and clean water discharges.

The proposed wastewater discharge was characterized by U.S. Oil in the application process for conventional pollutants, metals, cyanide, phenols, volatile organic compounds, acid organic compounds, base neutral organic compounds, and pesticides. Conventional parameter data reported below is based on data contained in the application, as well as on extensive (daily to weekly) monitoring completed during the term of the permit, and on the results of Class II water quality inspections. **Maximum daily values of pollutants with significant concentrations and/or of interest are tabulated below.** The maximum concentration and mass values did not necessarily occur on the same day. No organics are listed in the table below because none were quantified at greater than detection limits in any of the testing done during the term of the permit. Additional expanded information is included in **Appendices D and F.**

MAXIMUM DAILY VALUES OF POLLUTANTS (January 1991 – November 2001)

Parameter/ Date of Value	Concentration	Mass
BOD (Jan 1991)		66.7 lb/day
COD (Mar 1994)		799.1 lb/day
TOC (NPDES Application)	12.0 mg/l	
TSS (Apr 1996)		220.1 lb/day

Parameter/ Date of Value	Concentration	Mass
Ammonia (Mar 1991)		29.3 lb/day
Flow (Feb 1992)	1.21 million gallons per day	
Temperature (winter)	21.7 °C	
Temperature (summer)	26.7 °C	
pH (Jun 1991)	6.0 minimum/9.0 maximum	
Nitrate (Application)	2.4 mg/l	
Nitrogen (Total Organic) (Application)	2.2 mg/l	
Oil and Grease (Feb 1992)	14.4 mg/l	63 lb/day
Phosphorous (Application)	3.3 mg/l	
Sulfate (Application)	340 mg/l	
Sulfide (Jan 1997)		0.87 lb/day
Surfactants (Application)	<0.1 mg/l	
Antimony (4/22/98)	1.34 µg/l	
Arsenic (6/15/99)	12 µg/l	
Cadmium (6/25/97)	3.86 µg/l	
Chromium (Hexavalent) (5/31/94)	2.6 µg/l	
Chromium (Total) (5/31/94)	7.8 µg/l	
Lead (6/25/97)	2.5 µg/l	
Nickel (6/13/95)	38 µg/l	
Selenium (6/15/99)	9.3 µg/l	
Zinc (6/13/95)	59.4 µg/l	
Copper (4/6/94)	13.0 µg/l	
Phenols (Nov 1991)		0.15 lb/day

The chemical analysis of the influent and effluent was completed as requirement of the previous permit and was submitted in March 1993. The information was used in the analysis of the human health criteria. (see page 22 and Appendix I)

The biomonitoring studies were completed throughout the term of the NPDES permit. The information generated was used to establish the need for whole effluent toxicity (WET) permit limits. This is discussed later in the fact sheet (see page 20 and Appendix H).

The sediment monitoring studies were completed and the data submitted in June 1994. This is discussed later in the fact sheet (see page 23).

PROPOSED PERMIT LIMITATIONS AND CONDITIONS

Federal and State regulations require that effluent limitations set forth in an NPDES permit must be either technology- or water quality-based. Technology-based limitations are based upon the treatment methods available to treat specific wastewaters. Technology-based limitations are established by regulation or developed on a case-by-case basis (40 CFR, and Chapter 173-220 WAC). Water quality-based limitations are based upon compliance with the Washington State Surface Water Quality Standards (chapter 173-201A WAC), Ground Water Standards (chapter 173-200 WAC) or Sediment Quality Standards (chapter 173-204 WAC). The most stringent of these limitations must be chosen for each of the parameters of concern. Each of these types of limits is described in more detail below.

TECHNOLOGY-BASED EFFLUENT LIMITATIONS

Process Wastewater

The effluent limitations for the U.S. Oil refinery are based on Best Conventional Pollutant Control Technology (BCT), Best Available Technology Economically Achievable (BAT), Best Practicable Control Technology Currently Available (BPT), and New Source Performance Standards (NSPS) developed by the Environmental Protection Agency (EPA). Guidelines were published August 12, 1985 under 40 CFR Part 419 by the Environmental Protection Agency (EPA) for the topping subcategory of petroleum refining. These limitations are based on terms of a settlement agreement dated April 17, 1984, between EPA and the Natural Resources Defense Council resolving litigation about the EPA guidelines. The August 12, 1985 guidelines establish Best Available Technology (BAT) and Best Conventional Technology (BCT) as equal to Best Practicable Technology (BPT) for all parameters except phenols and chromium. Phenols and chromium are regulated by whichever guideline is more stringent. All known, available, and reasonable methods to control toxicants in the applicant's wastewater shall be used.

The federal effluent guidelines for petroleum refining were promulgated in 1982. Ecology's process in cases where the effluent guidelines are over 5 years old is to review the EPA development document and compare the production processes, the pollutants generated, the treatment efficiencies and review unit process design. This process is to verify that the effluent guidelines meet the intent of RCW 90.48.520 (AKART). In preparation of the U.S. Oil permit, Ecology compared current information on the U.S. Oil refinery with the data that formed the basis for the existing guidelines.

EPA recently completed a study of the petroleum refining industry (EPA-821-R-96-015) including treatment technologies, pollutants discharged, pollutant loadings, and potential water quality impacts. Based on this review, the petroleum refining industry was not selected as a candidate for revised effluent guidelines in EPA's biennial plan for 1998 through 1999. EPA determined that the best treatment technology currently available is essentially the same as that applied at the time the effluent guidelines were originally promulgated. They found that if the wastewater treatment systems at the refineries are properly operated and maintained, priority pollutants will be removed or treated to negligible or below detectable levels.

It is Ecology's determination that the U.S. Oil refinery is applying AKART in treating their wastewater. We made that determination through an analysis of current refinery conditions and

comparison to the effluent guidelines development document. EPA's study conclusions also support Ecology's determination.

Ecology has also applied new source performance standards on the basis of AKART, which makes the permit limitations more stringent than those applied in other states. The more stringent new source performance standards have been applied to all crude throughput increases since **1984**.

Ecology has also decided to include an NPDES permit condition to require that U.S. Oil submit an engineering report that provides predicted design capacities for their wastewater treatment system based upon current operating conditions. This permit condition also requires that U.S. Oil collect additional treatment unit influent and effluent data. The data will be evaluated to determine current treatment unit operating efficiencies. This permit condition will ensure that U.S. Oil is continuing to apply AKART to their wastewater

Since the previous NPDES permit was issued on August 15, 1990, U.S. Oil's crude oil throughput rate has slowly increased. The rate changes in refinery processes are shown below along with the applicable size and process factors selected for the EPA guidelines. Size and process factor determination is documented in **Appendix E**. These factors are multiplied by the actual feed stock in barrels per stream day to obtain an adjusted feed stock used in determining effluent limitations, except for determining BAT limitations for phenols and chromium. The following table lists the refinery processes, flows, and process and size factors as calculated in **Appendix E**.

	1978 Permit	1990 Permit-Tier 1	1990 Permit-Tier 2	Proposed Permit
Actual Feed Stock, bbls/stream day	27,000	30,500*	30,500	37,220
Desalting, bbls /stream day		25,500	30,500	37,220
Atmospheric Distillation, bbls/stream day		30,500	30,500	37,220
Vacuum Distillation, bbls/stream day		17,300	17,300	18,650
Catalytic Reforming, bbls/stream day**		3,800	3,800	4,140
Asphalt Production, bbls/stream day		5,300	5,300	3,770
Emulsified Asphalt, bbls/stream day				1,020
Process Factor	0.95	0.80	0.95	0.80
Size Factor	1.06	1.06	1.06	1.06
Adjusted Feed Stock, bbls/day	27,190	24,900	30,700	31,560

* All feedstock rates specified in this permit represent crude throughput plus slop oil and other recycled material.

** Baseline values for this process are used to calculate BAT limitations for phenols and chromium.

Increases in the feedstock rate are subject to limitations determined by Ecology to be the treatment level obtained from using all known, available, and reasonable treatment methods.

They are therefore subject to New Source Performance Standards. These limitations were calculated by multiplying the increase in adjusted feed stock, (31,563 - 27,189 = 4,374 barrels (bbls) per day) by New Source Performance Standards (NSPS). The resulting NSPS increment, based upon a current feedstock rate of 37,220 bbls per day, was then added to BAT and BPT limitations, based upon the adjusted baseline feedstock rate of 27,189 bbls per day. BCT limitations were not included because they are equivalent to BPT limitations.

The EPA/NRDC settlement agreement provided separate factors for calculating phenols, total chromium, and hexavalent chromium for the BAT limitation. These calculations required rate data for additional processes including hydrotreating and catalytic reforming. This information is included in the above table.

The permit limit calculations are tabulated in **Appendix E**. The actual permit limit is the most stringent of the BAT and BPT determinations. The proposed technology-based effluent limitations are listed in the table below in pounds per day unless otherwise noted.

Parameters	Proposed Technology-Based Limits (Outfall 001)	
	Monthly Average	Daily Maximum
Biochemical Oxygen Demand (5-day)	125	236
Chemical Oxygen Demand	628	1215
Total Suspended Solids	106	165
Oil and Grease	38	74
Oil and Grease (mg/l)	Cannot at anytime exceed 15 mg/l, and cannot exceed 10 mg/l more than 3 times per month	
Phenolic Compounds	0.65	1.77
Ammonia as N	14	31
Sulfide	0.71	1.56
Total Chromium	0.87	2.28
Hexavalent Chromium	0.06	0.13
pH (units)	In the range of 6.0 to 9.0	
Rainfall (inches/day)		
Flow (MGD)		
Feedstock Rate (bbls/stream-day and bbls/calendar-day)		

Stormwater Allocations

Contaminated stormwater from the process area is collected by the oily water sewer and is treated at the wastewater treatment facility.

Stormwater is not directly measured at the facility. The stormwater flow is calculated by the subtraction of an estimated dry weather flow from the total flow discharged each day. Dry weather flow has been determined through data analysis of total flow during dry weather time periods at the facility. This dry weather flow is used during storm events to estimate the volume of stormwater. The dry weather flow estimate has been updated to reflect current conditions. The dry weather flow in the draft permit was determined by using a refinery water balance and is 331,200 gallons per day (230 GPM).

Dry weather flow for the current condition has been estimated in two different ways. An estimate was determined using a water flow balance for each water user in the refinery. The estimate exercise was conducted in a cooperative effort with Tacoma Water. The City of Tacoma Water Utility instituted the program to audit the water usage of key industrial consumers within their service area for the purpose of identifying options to reduce water usage. The basis for the water balance report was an audit of water usage data for the calendar year 1998. Using the audit, the dry weather flow rate was determined to be 237 GPM. With the subtraction of hydrotest water generated during 1998, the dry weather flow was estimated to be 331,200 gallons per day (230 GPM).

The second method used to determine dry weather flow was to analyze five years of refinery flow and rainfall data (1996 –2000) for the dry summer months of June, July, and August. Each day's flow and rainfall data were compared and averaged after adjustment for rainfall and unit shut downs. Where flow through the refinery was less than 50 gpm the data was removed. Any rain periods with more than 0.01 inches of rain were also removed from the data set. To account for residue stormwater in the treatment system, the day following the rain effect was also removed from the data set. The original data set had 449 reporting days, the adjusted set contained 300 reporting days. The data was averaged to determine the average flow each day during the dry summer months. This number was compared to the water balance flow number. The adjusted average flow per day of the data set indicates a dry weather flow of 319,680 gallons per day (222 GPM). Both techniques for determining dry weather flow produced comparable answers. Ecology choose the water balance method to use in the NPDES Permit.

The stormwater allocations in the permit are based on guidelines in 40 CFR419.12(e). Phenolic compounds are not included in the stormwater allocation because of the compliance record of U.S. Oil. During the period of January 1991 to December 2000 the refinery has never been out of compliance with the permit limits for phenolic compounds. The allocations for stormwater only apply to runoff from areas associated with industrial activity, not outlying areas such as parking lots and surrounding acreage. During the months of June through September, U.S. Oil will only be allowed to claim the stormwater allocation when it can be demonstrated that measurable rainfall has occurred at the refinery site during the previous 10 calendar days. The allocations are tabulated below.

Parameters	Stormwater Allocation (Outfall 001) pounds/1000 gallons	
	Monthly Average	Daily Maximum
Biochemical Oxygen Demand (5-day)	0.22	0.40
Chemical Oxygen Demand	1.5	3.0

Parameters	Stormwater Allocation (Outfall 001)	
	pounds/1000 gallons	
	Monthly Average	Daily Maximum
Total Suspended Solids	0.18	0.28
Oil and Grease	0.067	0.13

Marine Terminal Stormwater

The containment area at the Marine Terminal generates stormwater that is of moderate risk of having petroleum contamination, due to past oil spills. The stormwater is collected in a vault that allows any oil present to separate, and the water is discharged from under a weir leaving the oil behind. The stormwater is then pumped to the infiltration basin, an area on the Marine Terminal property that has a sandy floor and is surrounded by berms, for release to groundwater. The containment liner system was constructed and outfall 003 established as a result of Ecology Order # 98SP-016 after a spill that occurred from the overflow of Tank #8503 in March of 1998. USOR has been intermittently discharging effluent into the infiltration basin since the containment liner construction was complete in October of 1998.

The limitations listed below are similar to the ones required for stormwater from other, nearby petroleum storage tank containment areas. The monitoring for BOD₅, COD, NWTPH-D_x, and NWTPH-G_x is intended to gather information about these parameters in stormwater from petroleum storage facilities. Sampling is only required during those months where stormwater is being discharged to the infiltration basin.

Parameter	Marine Terminal Stormwater Limitation (Outfall 003)	Monitoring Frequency/Sample Type
Oil and Grease	The concentration in the discharge shall at no time exceed 15 mg/l	Once per month/grab when discharging
pH	In the range of 6.0 to 9.0	Once per month/grab when discharging
Biochemical Oxygen Demand (5-day)	Once per year/grab	
Chemical Oxygen Demand	Once per year/grab	
NWTPH-D _x	Once per year/grab	
NWTPH-G _x	Once per year/grab	

SURFACE WATER QUALITY-BASED EFFLUENT LIMITATIONS

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 states that waste discharge permits shall be

conditioned such that the discharge will meet established Water Quality Standards. The Washington State Water Quality Standards (Chapter 173-201A WAC) is a state regulation designed to protect the beneficial uses of the waters of the state. Surface water quality-based effluent limitations may be based on an individual waste load allocation (WLA) or on a WLA developed during a basin wide total maximum daily loading study (TMDL).

Numerical Criteria for the Protection of Aquatic Life

"Numerical" water quality criteria are numerical values set forth in the State of Washington's Water Quality Standards for Surface Waters (chapter 173-201A WAC). They specify the levels of pollutants allowed in a receiving water while remaining protective of aquatic life. Numerical criteria for dissolved oxygen and turbidity are among the criteria contained in WAC 173-201A-030. Numerical criteria are also listed for many toxic substances including chlorine and ammonia (WAC 173-201A-040). Numerical criteria set forth in the Water Quality Standards are used to derive the effluent limits in a discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

Numerical Criteria for the Protection of Human Health

The U.S. EPA has promulgated 91 numeric water quality criteria for the protection of human health that are applicable to Washington State (EPA 1992). These criteria are designed to protect humans from cancer and other diseases and are primarily applicable to fish and shellfish consumption and drinking water from surface waters.

Narrative Criteria

In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) are used to limit acute and chronic toxicity, radioactivity, and other deleterious materials, and prohibit the impairment of the aesthetic value of the waters of the state. Narrative criteria describe the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the State of Washington.

Antidegradation Policy

The State of Washington's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when the natural conditions of a receiving water are of higher quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. More information on the State Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

Critical Conditions

Surface water quality-based limits are derived for the waterbody's critical condition, which represents the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or characteristic water body uses.

Mixing Zones

The Water Quality Standards allow the Department of Ecology to authorize mixing zones around a point of discharge in establishing water quality-based effluent limits. Both "acute" and "chronic" mixing zones may be authorized for pollutants that can have a toxic effect on the aquatic environment at the point of discharge. WAC 173-201A-100(7)(a)(i) states that a dilution zone in an estuary may not extend in any horizontal direction from the discharge port(s) for a distance greater than 200 feet plus the depth of water over the discharge port(s) as measured during mean lower low water, and cannot occupy greater than 25% of the width of the water body during mean lower low water. A mixing zone for this discharge has been determined for the U. S. Oil point of discharge.

Description of the Receiving Water

The receiving water classification of Blair Waterway has been designated a Class B marine waterbody. The characteristic uses include the following: industrial and agricultural water supply; stock watering; fish migration and shellfish spawning, rearing and harvesting; wildlife habitat; secondary contact recreation; sport fishing; boating and aesthetic enjoyment; commerce and navigation.

Surface Water Quality Criteria

Applicable criteria for the receiving water are defined in chapter 173-201A WAC for aquatic biota. Criteria for this discharge are summarized below:

Fecal Coliforms	100 colonies/100 ml maximum geometric mean
Dissolved Oxygen	5.0 mg/L minimum
Temperature	19 degrees Celsius maximum; if natural conditions exceed 19 degrees, no temperature increases will be allowed which will raise the receiving water temperature more than 0.3 degrees Celsius
pH	6.5 to 8.5 standard units
Turbidity	less than 10 NTU above background when background turbidity is less than 50 NTU; no more than a 20% increase in turbidity when the background turbidity is greater than 50 NTU
Toxics	No toxics in toxic amounts

Consideration Of Water Quality-Based Limits for Numeric Criteria

Mixing Zone Authorization

Pollutant concentrations in the proposed discharge exceed water quality criteria with technology-based controls which the Department has determined to be AKART. A mixing zone is authorized in accordance with the geometric configuration, flow restriction, and other restrictions for mixing zones in Chapter 173-201A WAC and is defined as follows:

Outfall Configuration

U. S. Oil's outfall consists of an 84-inch pipe that connects with the Lincoln Avenue ditch with a Red Valve Series 35 check valve. The check valve is a rubber duckbill check sleeve that

prevents backflow of tidewaters into Lincoln Avenue Ditch during high tide. The U. S. Oil discharge is out of a slot check valve rather than an open pipe. Information on the outfall is available in the Mixing Zone Evaluation for U. S. Oil's Discharge to Blair Waterway submitted to Ecology in May of 2000.

Chronic Mixing Zone

WAC 173-201A-100(8)(b)(I) specifies mixing zones shall not extend in any horizontal direction from the discharge point or ports for a distance greater than 200 feet plus the depth of water over the discharge ports as measured during mean lower low water (MLLW). The chronic zone therefore extends 200 feet horizontally from the discharge point.

Acute Mixing Zone

WAC 173-201A-100(8)(b) specifies that, in estuarine waters, a zone where acute criteria may be exceeded shall not extend beyond 10% of the distance established for the maximum or chronic zone as measured independently from the discharge point. The acute zone therefore extends 20 feet from the discharge slot.

The dilution factors of effluent to receiving water that occur within these zones have been determined at the critical flow condition of May through October by the use of modeling mentioned above. The dilution factors have been determined to be:

	Acute	Chronic
Aquatic Life	2.0	71.3
Human Health, Carcinogen		71.3
Human Health, Non-carcinogen		71.3

The mixing zone analysis was completed for the aquatic life chronic criteria dilution factor using the highest monthly average flow as a design criteria. Ecology's permit writer's manual allows the permittee to use the annual average flow to make the mixing zone evaluation for carcinogenic human health criteria. This lower flow value will increase the amount of available dilution. In the absence of that information Ecology has based the dilution factor for carcinogenic human health criteria on the more stringent value obtained for the chronic aquatic life criteria.

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near field) or at a considerable distance from the point of discharge (far field). Toxic pollutants, for example, are near-field pollutants--their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as BOD is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

The derivation of water quality-based limits also takes into account the variability of the pollutant concentrations in both the effluent and the receiving water. Water quality-based limits are derived for the waterbody's *critical condition*, which represents the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota and existing or characteristic water body uses. The critical condition for the Blair Waterway occurs in the late summer when there is little or no stormwater runoff in the Lincoln Avenue Ditch and when the discharge from U.S. Oil comprises nearly all of the flow in the Ditch and is in its most concentrated form.

Dissolved Oxygen and BOD₅ U.S. Oil has limited information on the dissolved oxygen (DO) concentration in their effluent, since they were not required to monitor it in their existing permit.

U.S. Oil has monitored for this parameter daily during the month of December 1999. DO concentrations during this period were generally much higher than the water quality standard for DO in the receiving water (for a class B marine waterway the standard is 5 mg/l), with an average of 7 mg/l. The Department is not aware of any information that indicates that the Blair Waterway is impaired due to reduced DO. It is Ecology's judgement that the effluent will not cause a violation of the DO standard in the receiving water.

Temperature. The water quality standards state the temperature shall not exceed 19 °C due to human activities. When natural conditions exceed 19 °C no temperature increases will be allowed which will raise the receiving water temperature greater than 0.3 °C. Incremental temperature increases resulting from point source activities shall not, at any time, exceed $t=16/(T)$. "T" represents the background temperature and represents the highest ambient water temperature in the vicinity of the discharge and "t" represents the maximum possible temperature increase measured at the mixing zone boundary.

The impact of the discharge on the temperature of the receiving water was modeled by simple mixing analysis at critical condition. Temperature is evaluated using the critical chronic mixing zone dilution factor of 71.3, the 95th percentile effluent temperature of 27.5 °C, and the maximum observed surface water temperature of 15.3 °C (9/24/97) at the Ecology ambient monitoring station in Commencement Bay (CMB003). Based on these data water quality compliance for temperature depends on comparison to the allowable incremental change in far-field receiving water temperature. The incremental temperature increase allowance in marine water (i.e. $t=16/T$ where T is the maximum receiving water temperature 1.04 °C=16/15.3 °C) is equal to 1.04 °C. The predicted far-field temperature following initial dilution (T_{final}) is calculated using the following equation:

$$T_{final} = T_{ambient} + (T_{effluent} - T_{ambient}) / D_{cmz} \quad \text{where:}$$

$T_{ambient}$ = Maximum receiving water temperature in ° C.

$T_{effluent}$ = 95th percentile effluent temperature in ° C (un-stratified data).

D_{cmz} = Critical chronic mixing zone dilution factor.

$$T_{final} = 15.3 + (27.5 - 15.3) / 71.3$$

The predicted temperature is 15.47 °C at the edge of the chronic mixing zone. The incremental increase in temperature is therefore 0.17 °C (15.47 – 15.3), which is within the allowable incremental change of 1.04 °C. Under these conditions there is no predicted violation of The Water Quality Standards. An effluent limitation was determined not to be necessary.

pH. Because of the high buffering capacity of marine water, compliance with the technology-based limits of 6 to 9 should assure compliance with the Water Quality Standards of 6.5 – 8.5 pH units for Class B Surface Waters at the edge of the mixing zone.

Fecal coliforms The domestic sewage generated at the U.S. Oil refinery enters the Tacoma sanitary sewer via a segregated collection system and is treated at the municipal wastewater treatment plant. Since there is no domestic component to the wastewater treated in the U.S. Oil wastewater system, no chlorination of the effluent is necessary and no fecal coliforms are expected in the effluent.

Toxic pollutants. Federal regulations (40 CFR 122.44) require NPDES permits to contain effluent limits for toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the water quality criteria. This process occurs concurrently with the derivation of technology-based effluent limits. Facilities with technology-based effluent limits

defined in regulation are not exempted from meeting the Water Quality Standards or from having water quality-based effluent limits. Criteria for toxic substances are listed in Chapter 173-201A-040.

The Department has determined through review of available effluent data and knowledge of the refinery process that the applicant has the toxic pollutants ammonia, arsenic, chromium (total and hexavalent), copper, lead, mercury, nickel, selenium, silver, sulfide and zinc in their effluent. A determination of the reasonable potential of these pollutants to cause a violation of the Water Quality Standards is therefore required.

The determination of potential of ammonia, arsenic, chromium, copper, lead, mercury, nickel, selenium, silver, sulfide, and zinc to exceed the marine water quality criteria was conducted with the assumption that the water quality criteria must be met at the point where the Lincoln Avenue Ditch discharges into the Blair Waterway. The receiving water background data for the metallic parameters was obtained from a study undertaken by the Western States Petroleum Association (WSPA). Effluent values were obtained from the permit application, an ultra-clean metals study conducted by U.S. Oil in 1994, a intensive effluent characterization study of trace metals during December 1999 through March 2000, Discharge Monitoring Report data from 1990-1999 and Ecology inspection data.

The reasonable potential for exceeding marine water quality criteria was evaluated with procedures given in EPA's Technical Support document for Water Quality-Based Toxics Control (1991). The procedure with parameters specific to U.S. Oil are shown in the spreadsheet included as **Appendix G**. The dilution factors determined above were used in the analysis.

Calculations using all applicable data and the spreadsheet TSDCAL9 resulted in a determination that there is no reasonable potential for this discharge to cause a violation of water quality standards. This determination assumes that the Permittee meets the other effluent limits for this permit.

Whole Effluent Toxicity

The Water Quality Standards for surface waters also require that the effluent not cause toxic effects in the receiving waters. Many pollutants cannot be detected by commonly available methods. However, toxicity can be measured directly by exposing living organisms to the wastewater in laboratory tests and measuring the response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent, and therefore this approach is called whole effluent toxicity (WET) testing. WET testing measures both acute toxicity and chronic toxicity.

Acute toxicity tests measure mortality as the significant response to the toxicity of the effluent. Dischargers who monitor their wastewater with acute toxicity tests are providing an indication of the potential lethal effect of the effluent to organisms in the receiving environment.

Chronic toxicity tests measure various sublethal toxic responses such as retarded growth or reduced reproduction. Chronic toxicity tests often involve either a complete life cycle test of an organism with an extremely short life cycle or a partial life cycle test on a critical stage of one of a test organism's life cycles.

Accredited WET testing laboratories have the proper WET testing protocols, data requirements, and reporting format. Accredited laboratories are knowledgeable about WET testing and capable of calculating an NOEC, LC₅₀, EC₅₀, IC₂₅, etc. All accredited labs have been provided the most recent version of the Department of Ecology Publication # WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* which is referenced in the permit. Any Permittee interested in receiving a copy of this publication may call the Ecology

Publications Distribution Center 360-407-7472 for a copy. Ecology recommends that Permittees send a copy of the acute or chronic toxicity sections(s) of their permits to their laboratory of choice.

Because of the complex nature of the permittee's effluent and the potential for it to contain toxic chemicals, current NPDES Permit required the permittee to characterize the whole effluent toxicity of the effluent as authorized by RCW 90.48.520 and 40 CFR 122.44 and generally in accordance with procedures in chapter 173-205 WAC.

Acute Toxicity. As required in the current permit, the Permittee conducted a one year acute WET characterization study that included bimonthly samples and acute bioassay testing in 100 % final effluent using three organisms. The three organisms tested were rainbow trout, fathead minnow, and *Daphnia pulex*. The results of the acute characterization study and the follow-up testing can be viewed in **Appendix H**.

After one year of WET testing had been conducted, a most sensitive species was chosen. The water flea, *Daphnia pulex*, was determined to be the most sensitive species, based on it's highest mortality rate. This organism was tested quarterly for the remainder of the permit term. Rainbow trout was also tested semiannually as required in the current permit, but the test was conducted at 100% effluent rather than at 65% effluent that the permit requires.

The criteria for deciding if an acute WET limit is required is a median survival of 80% in 100% effluent and no test with a survival of less than 65% in the last three calendar years of testing. As the test results in **Appendix H** demonstrate, the bioassays of the effluent in the last three calendar years meet these criteria. According to chapter 173-205-050(2)(a)(i) WAC no acute WET limit is required.

The ACEC means the maximum concentration of effluent during critical conditions at the boundary of the zone of acute criteria exceedance assigned pursuant to WAC 173-201A-100. The ACEC for this discharge is 50% effluent.

U.S. Oil will be required to recharacterize their effluent for acute toxicity prior to the next permit renewal, in the fifth year of the permit.

Chronic Toxicity. As required in the current permit, the Permittee conducted a one year chronic WET characterization study that included quarterly samples and chronic bioassay testing using a prescribed definitive dilution series and three organisms. The three organisms tested were sheepshead minnow, oyster larvae, and echinoderm sperm. The following are the results of the chronic characterization study:

SAMPLE DATE	SHEEPSHEAD MINNOW NOEC % Effluent	OYSTER LARVAE NOEC % Effluent	ECHINODERM SPERM NOEC % Effluent
03/04/91	50	> 6.25	25
05/15/91	100	12.5	100
10/14/91	25	6.25	100
02/27/92	25	6.25	100

The maximum percentage of effluent that can be used while testing with these species is 70%, while the remaining 30% must be saltwater to allow the test species to survive. U.S. Oil will be required to characterize their effluent using top smelt and mysid shrimp, which are marine species that can tolerate freshwater. This will allow the species to be tested at the required ACEC of 50%. The characterization will consist of grab samples taken bimonthly for one year, for a total of six samples.

The results will be used to determine if a chronic WET limit will be required for the duration of the permit. The criteria for determining if a chronic WET limit is required a statistically significant difference in response between the control and the ACEC. If a limit is necessary, U.S. Oil will be required to conduct a chronic bioassay of their effluent on a quarterly basis for the remainder of the permit, using the same species as were used in the initial characterization, on a rotating basis. If no limit is necessary, U.S. Oil will sample their effluent twice in the year prior to submission of the application for permit renewal.

Human Health Criteria

Washington's water quality standards include 91 numeric health-based criteria that must be considered in NPDES permits. These criteria were promulgated for the state by the U.S. EPA in its National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992).

The Department has determined that the effluent must be evaluated for the presence of chemicals of concern for human health. The discharger's high priority is based on its status as a major discharger and knowledge of data and process information indicating that regulated chemicals occur in the discharge. The discharge was therefore evaluated for reasonable potential to violate the human health criteria.

A determination of the discharge's potential to cause an exceedance of the water quality standards was conducted as required by 40 CFR 122.44(d). The reasonable potential determination was evaluated with procedures given in the Technical Support Document for Water Quality-Based Toxics Control (EPA/505/2-90-001) and the Department's Permit Writer's Manual (Ecology Publication 92-109, July, 1994).

Human health criteria are required to be met at the edge of the chronic zone. The mixing zone specified for chronic aquatic life-based criteria was used to evaluate the reasonable potential to violate the human health criteria. The dilution ratio which was used is 71.3 for both carcinogens and non-carcinogens.

Appendix I tabulates the human health criteria and an evaluation for the reasonable potential to exceed. Pesticides, PCB's, PBB's, DDT, and asbestos were excluded from the evaluation because they are unlikely to be present or detectable in the effluent. In the previous permit, U.S. Oil was required to monitor dioxin and furan concentrations in the wastewater stream from the refinery's catalytic reformer units. Although none of the 17 individual chemicals that make up the class of chemicals commonly described as dioxins or furans were detected in the samples, the samples did yield detectable levels of total furans, a measure of the combined impact of furans.

Reasonable potential to exceed human health criteria was determined for each criteria using an Ecology Excel spreadsheet. **Appendix I** tabulates the reasonable potential determination.

The calculation of reasonable potential to exceed the criteria depends on both the detection level of the test method and on the number of tests conducted. The test methods used for many of these parameters did not meet the detection limits necessary to evaluate reasonable potential to exceed the extremely low human health criterion. There was also a very limited

amount of data available to evaluate. As a result, it was not possible to evaluate the reasonable potential to exceed human health criteria of several parameters. In order to more adequately characterize the effluent, the NPDES permit will include a condition requiring additional human health criteria testing with the necessary detection limits identified for those parameters with extremely low criterion values. The permittee will be required to meet these detection levels if the test methods are available. The information produced will be evaluated at the time of the next NPDES permit reissuance.

Arsenic

In 1992 the USEPA adopted risk-based arsenic criteria for the protection of human health for the State of Washington. The criterion for marine waters is 0.14 µg/L inorganic arsenic, and is based on exposure from fish and shellfish tissue ingestion. The freshwater criterion is 0.018 µg/L, and is based on exposure from fish and shellfish tissue and water ingestion. These criteria have caused confusion in implementation because they differ from the drinking water maximum contaminant level (MCL) of 50 µg/L, which is not risk-based, and because the human health criteria are sometimes exceeded by natural background concentrations of arsenic in surface water and ground water.

A regulatory mechanism to deal with the issues associated with natural background concentrations of arsenic in groundwater-derived drinking waters is currently lacking. Consequently, the Water Quality Program, at this time, has decided to use a three-pronged strategy to address the issues associated with the arsenic criteria. The three strategy elements are:

1. Pursue, at the national level, a solution to the regulatory issue of groundwater sources with high arsenic concentrations causing municipal treatment plant effluent to exceed criteria. The upcoming revision of the MCL for arsenic offers a national opportunity to discuss how drinking water sources can affect NPDES wastewater dischargers. This discussion should focus on developing a national policy for arsenic regulation that acknowledges the risks and costs associated with management of the public exposure to natural background concentrations of arsenic through water sources.

2. Additional and more focussed data collection. The Water Quality Program will in some cases require additional and more focussed arsenic data collection, will encourage or require dischargers to test for source water arsenic concentrations, and will pursue development of a proposal to have Ecology's Environmental Assessment Program conduct drinking water source monitoring as well as some additional ambient monitoring data. At this time, Washington NPDES permits will contain numeric effluent limits for arsenic based only on treatment technology and aquatic life protection as appropriate.

3. Data sharing. Ecology will share data with USEPA as they work to develop new risk-based criteria for arsenic and as they develop a strategy to regulate arsenic.

This permit does not include any limitations for arsenic. Arsenic is measured in U. S. Oil's effluent during Ecology's sampling inspections and will be sampled by U. S. Oil during the permit term as required by other permit conditions.

Sediment Quality. The Department has promulgated aquatic sediment standards (Chapter 173-204 WAC) to protect aquatic biota and human health from the effects of sediment contamination. These standards state that the Department may require Permittees to evaluate

the potential for the discharge to cause a violation of applicable standards (WAC 173-204-400).

A sediment monitoring study was completed as part of the NPDES permit issued in 1990. The study required U.S. Oil to sample sediments in the Lincoln Avenue Ditch upstream and downstream of the discharge from U.S. Oil's outfall pipeline. The study was completed. A new study will be required in the proposed permit to look at contamination in the sediments near the tide gate discharge to the Blair Waterway.

GROUND WATER QUALITY LIMITATIONS

The Department has promulgated Ground Water Quality Standards (Chapter 173-200 WAC) to protect beneficial uses of ground water. Permits for process water discharges issued by the Department shall be conditioned in such a manner so as not to allow violations of those standards (WAC 173-200-100). U.S. Oil has several small surface impoundments lined with HDPE (a plastic material used to reduce leakage) that are used primarily for storage of treated stormwater.

Currently, it is the policy of the Department to require all surface impoundments that regularly store or treat process water to demonstrate compliance with the Ground Water Standards by performing a hydrogeological study of the pond and the receiving water below. Stormwater impoundments are not subject to the same requirements at this time. The process water impoundments are lined and there should be no leakage from the treatment systems. Therefore no limitations or actions are required based on potential effects to groundwater.

MONITORING AND REPORTING REQUIREMENTS

Effluent monitoring, recording, and reporting are required (WAC 173-220-210) to verify that the treatment process is functioning correctly and the effluent limitations are being achieved. As discussed above, additional monitoring will be required to ensure that the discharge meets both water quality and human health criteria. The monitoring and testing schedule is detailed in the permit under Conditions S.1 - S.5. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring.

LAB ACCREDITATION

With the exception of certain parameters, the permit requires all monitoring data to be prepared by a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, *Accreditation of Environmental Laboratories*.

PERFORMANCE BASED REDUCTION OF MONITORING FREQUENCIES

EPA published guidance in April of 1996 entitled, "Interim Guidance For Performance-Based Reduction of NPDES Permit Monitoring Frequencies". EPA's goal is to reduce the regulatory burden associated with reporting and monitoring on the basis of excellent performance. The guidance provides a tool to evaluate the facility's performance. Several parameters in U.S. Oil's treated effluent were evaluated using this guidance. Ammonia, phenols, and BOD were

evaluated. Sulfide was excluded from this analysis because Ecology does not have the required two years of sulfide data measured using low detection limits. In the current permit the frequency of sulfide monitoring was reduced from 7/7 to 1/7. In addition to the approach recommended in the EPA guidance, maximum values were also compared with permit limits. The following table summarizes two years (10/96-10/98) of recent data and the current and proposed monitoring frequencies.

	Ammonia	BOD	Phenols
Monthly average permit limit in current permit (lbs/day)	14	120	0.5
Daily maximum permit limit in current permit (lbs/day)	30	230	1.8
Long-term average (10/96-10/98, lbs/day)	1.14	8.42	0.018
Long-term average/ monthly average permit limit (percent basis)	0.081	0.07	0.01
Maximum of the monthly averages (lbs/day)	1.8	26.4	0.04
Maximum Value (lbs/day)	3.9	54.6	0.08
Second Highest Maximum Value (lbs/day)	2.0	44.6	0.06
Current permit monitoring frequency	7/7	3/7	1/7
Monitoring frequency allowed under Water Quality Policy	1/7	1/7	1/2month
Proposed permit monitoring frequency	1/7	1/7	1/2month

SPILL REPORTING

The Department has determined that the Permittee manufactures and stores a quantity of chemicals and raw materials that have the potential to cause water pollution if accidentally released. The proposed permit requires the Permittee to notify the Department of any spills or unplanned discharges of these materials in accordance with the facility's reporting system.

OTHER PERMIT CONDITIONS

REPORTING AND RECORDKEEPING

The conditions of Permit Condition S2 are based on the authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 173-220-210).

NON-ROUTINE AND UNANTICIPATED DISCHARGES

Occasionally, this facility may generate wastewater which is not characterized in their permit application because it is not a routine discharge and was not anticipated at the time of application. These typically are waters used to pressure test storage tanks or fire water systems or leaks from drinking water systems. These are typically clean waste waters but may be contaminated with pollutants. The permit contains an authorization for non-routine and unanticipated discharges. The permit requires a characterization of the these waste waters for pollutants and examination of the opportunities for reuse. Depending on the nature and extent of pollutants in this waste water and opportunities for reuse, Ecology may authorize a direct

discharge via the process wastewater outfall or through the stormwater outfall for clean water (Outfall 002), require the wastewater to be placed through the facilities wastewater treatment process or require the water to be reused.

TREATMENT EFFICIENCY STUDY AND ENGINEERING REPORT

There is currently very little data available on treatment efficiencies for U.S. Oil's wastewater treatment plant. The proposed permit includes a study to evaluate the efficiency of the wastewater treatment system. Samples of influent and effluent will also be analyzed for priority pollutants. Flow monitoring done at the time of sampling will provide information on how the system operates at different hydraulic or organic loading rates. U.S. Oil will be required to calculate treatment and removal efficiencies from the results of the analysis and submit the data to Ecology. The Department will review the data and compare it to published information on wastewater treatment efficiencies. If it is found that the Permittee's effluent plant is performing below acceptable levels, Ecology will require U.S. Oil to upgrade their wastewater treatment system.

In addition to the treatment efficiency study, Ecology is requiring the Permittee to prepare and submit an engineering report on their wastewater treatment system in accordance with Chapter 173-240 WAC.

The Department will consider requiring a treatment efficiency study and engineering report during each permit cycle as a means of continually evaluating the adequacy of the wastewater treatment at U.S. Oil's refinery.

POLLUTION PREVENTION PLANNING

Pollution Prevention Planning To Date

In accordance with WAC 173-307, U.S. Oil submitted a Pollution Prevention Plan to Ecology in September 1992. Annual progress reports were submitted in 1993, 1994, 1995, and 1996. The 5-year update for the Pollution Prevention Plan was submitted in December of 1997. U.S. Oil has implemented projects ranging from paving of refinery roadways to prevent gravel and dirt from increasing the generation of sewer cleanings and API sludge, to changing the way that laboratory glassware is cleaned to reduce the volume of glass cleaning solvent used. During a recent crude tank cleaning effort, U.S. Oil used a new technique which increases the amount of oil that can be recovered from the sludge removed from the tank. The sludge from crude tanks is a listed hazardous waste, and increasing the oil recovery from the sludge reduces the volume of listed waste produced. In 1998, U.S. Oil improved the way they handled non-hazardous waste biological sludge by installing a concrete pad to receive the sludge after it is digested and dewatered. Previously the sludge fell into an unlined pit. The pad allows the sludge additional dewatering time and allows the leachate to be collected and returned to the treatment system, resulting in greater protection for ground water.

New Requirements

Although many of the pollution prevention strategies identified and implemented under these requirements also reduce pollutant impacts on water quality, the Permittee has not been directed to specifically review and evaluate facility processes and activities for the source reduction and control of water pollutants. A water-oriented pollution prevention plan is being required in the proposed permit. Ecology's goals and objectives for developing and

implementing pollution prevention plans are to identify, reduce, eliminate, and prevent the generation and release of pollutants to influent wastewater streams, stormwater, and/or waters of the state and to prevent violations of surface water, ground water, and sediment quality standards. The identification, evaluation, and selection of pollution prevention opportunities will be documented in the plan submitted to Ecology. Although crude oil can be considered a hazardous substance, U.S. Oil will not be required to look for raw material feedstock substitutions for crude oil, since refineries have no practical ability to reduce the quantity or toxicity of crude oil.

The plan should comprehensively address all sources of water pollutants. Previous requirements have focused on specific types of sources (e.g., BMPs). These specific requirements are discussed in more detail in the following paragraphs. While the pollution prevention plan is not limited to these specific areas, it should address them using existing guidance. U.S. Oil will be expected to apply the methodologies from existing guidance to cover other sources, pathways, or measures not covered within the strict scope of that guidance.

The pollution prevention plan requirements include the identification and implementation of Best Management Practices (BMPs). Pursuant to RCW 90.48 and Sections 302 and 402 for the Clean Water Act, BMPs may be incorporated as permit conditions. BMPs are actions or procedures to prevent or minimize the potential for the release of pollutants or hazardous substances in significant quantities to surface waters. BMPs, though normally qualitative, are most effective when used in conjunction with numerical effluent limits in NPDES permits.

The plan requirements also address stormwater pollution prevention. Ecology has developed guidance for the prevention of stormwater runoff contamination, entitled *Stormwater Pollution Prevention Planning for Industrial Facilities* (September 1993). The pollution prevention plan may incorporate the appropriate sections of any other plans previously developed by the refinery, which include procedures for prevention of stormwater runoff contamination. These plans, however, will not be all inclusive of the BMPs necessary for prevention of stormwater pollution by more conventional pollutants - in particular, total suspended solids. They will also not address "clean" areas of the facility, that is those areas where petroleum products or hazardous materials are not stored or used. These "clean" areas contribute conventional pollutants to the facility's stormwater.

The pollution prevention plan requires a review of solid waste handling and disposal procedures to prevent solid waste and solid waste leachate from causing pollution of state waters. In addition, the plan will include a description of measures already taken to prevent the accidental release of pollutants to state waters and for minimizing damages if such a spill occurs.

TREATMENT SYSTEM OPERATING PLAN

In accordance with state and federal regulations, the Permittee is required to take all reasonable steps to properly operate and maintain the treatment system (40 CFR 122.41(e) and WAC 173-220-150(1)(g)). The operations and maintenance (O&M) manual must be updated as necessary and must be kept available at the treatment plant.

For the purposes of the permit, a treatment system operating plan (TSOP) is a concise summary of specifically defined elements of the O&M manual. The requirements for a TSOP include information on baseline operating conditions, operating procedures and conditions to maintain efficiency in case of reduced feedstock rates, upset procedures, and a description of any regularly scheduled maintenance or repair activity at the refinery which would significantly affect the volume or character of the wastewater.

CONSTRUCTION OF NEW WASTEWATER DISCHARGE LINE

The Department has determined that the Permittee has potential to cause pollution through a leaky wastewater discharge line that is over twenty years old. The proposed permit requires the Permittee to prepare an engineering report that will describe the replacement of the current line that runs along the northern refinery boundary. USOR will construct the new outfall line from the facility wastewater treatment plant to the current Blair Waterway discharge point. The permit will require USOR to submit to Ecology an Engineering Design Report (EDR) that describes the new outfall alignment, the associated pump station, flow measurement and sampling devices and construction plans and construction specifications for the new outfall. The EDR will be scheduled to be submitted to the Department within two years of the issuance of this Permit and construction finished within four years of the issuance of this Permit.

GENERAL CONDITIONS

General Conditions are based directly on state and federal law and regulations and have been standardized for all NPDES permits issued by the Department.

PERMIT ISSUANCE PROCEDURES

PERMIT MODIFICATIONS

The Department may modify this permit to impose numerical limitations, if necessary to meet Water Quality Standards, Sediment Quality Standards, or Ground Water Standards, based on new information obtained from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

The Department may also modify this permit as a result of new or amended state or federal regulations.

RECOMMENDATION FOR PERMIT ISSUANCE

This permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to control toxics, protect human health, aquatic life, and the beneficial uses of waters of the State of Washington. The Department proposes that this permit be issued for 5 years.

REFERENCES FOR TEXT AND APPENDICES

Environmental Protection Agency (EPA)

1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001.

1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington, D.C.

1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water. EPA/600/6-85/002a.

Washington State Department of Ecology

1994. Permit Writer's Manual - Procedures for Writing Wastewater Discharge Permits.
Updated March 1995.

REVIEW BY THE PERMITTEE

The proposed permit was reviewed by the Permittee for verification of facts. Only factual items were corrected in the draft permit.

APPENDICES

- A Public Involvement Information
- B Glossary
- C Technical Calculations Information
- D Discharge Monitoring Report Summary
- E U.S. Oil Technology Based Limits and Process Factor Determination
- F Metals Data
- G Reasonable Potential Calculations
- H Acute Biomonitoring Results
- I Human Health Criteria Evaluation
- J Response To Comments

APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

The Department has tentatively determined to reissue a permit to the applicant listed above. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

The Department will publish a Public Notice of Draft (PNOD) on January 14, 2002 in the Tacoma News Tribune to inform the public that a draft permit and fact sheet are available for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments should be mailed to:

Paul E. Skillingstad
Department of Ecology
Industrial Section
P.O. Box 47706
Olympia, Washington 98504

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the thirty (30) day comment period to the address above. The request for a hearing shall indicate the interest of the party and reasons why the hearing is warranted. The Department will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-220-090). Public notice regarding any hearing will be circulated at least thirty (30) days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing (WAC 173-220-100).

The Department will consider all comments received within thirty (30) days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by telephone, (360) 407-6949, or by writing to the address listed above.

APPENDIX B--GLOSSARY

Acute Toxicity--The lethal effect of a compound on an organism that occurs in a short period of time, usually 48 to 96 hours.

AKART-- An acronym for "all known, available, and reasonable methods of treatment".

Ambient Water Quality--The existing environmental condition of the water in a receiving water body.

Ammonia--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Average Monthly Discharge Limitation—The average of the measured values obtained over a calendar month's time.

Best Management Practices (BMPs)--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD₅--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD₅ is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass--The intentional diversion of waste streams from any portion of a treatment facility.

Chlorine--Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic Toxicity--The effect of a compound on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Clean Water Act (CWA)—The Federal Water Pollution control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Compliance Inspection – Without Sampling—A site visit for the purpose of determining the compliance of a facility with the terms and conditions of this permit or with applicable statutes and regulations.

Compliance Inspection – With Sampling—A site visit to accomplish the purpose of a Compliance Inspection – Without Sampling and as a minimum, sampling and analysis for all parameters with limits, in the permit to ascertain compliance with those limits; and , for

municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Additional sampling may be conducted.

Composite Sample--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

Construction Activity--Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

Continuous Monitoring—Uninterrupted, unless otherwise noted in the permit.

Critical Condition--The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Dilution Factor--A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the percent effluent fraction e.g., a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

Engineering Report--A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal Coliform Bacteria--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab Sample--A single sample or measurement taken at a specific time or over a short period of time as is feasible.

Industrial Wastewater--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Major Facility--A facility discharging to surface water with an EPA rating score of >80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Daily Maximum Discharge Limitation--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Mixing Zone--An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in state regulations (chapter 173-201A WAC).

National Pollutant Discharge Elimination System (NPDES)--The NPDES (Section 402 of the Clean Water Act) is the Federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the State of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both State and Federal laws.

pH--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Quantitation Level (QL)--A calculated value five times the MDL (method detection level).

Responsible Corporate Officer--A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or the manager of one or more manufacturing, production or operating facilities employing more than 250 persons or have gross annual sales or expenditures exceeding \$25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures (40 CFR 122.22)

Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Suspended Solids (TSS)--Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

State Waters--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

Upset--An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water Quality-based Effluent Limit--A limit on the concentration of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water.

APPENDIX C--TECHNICAL CALCULATIONS

Several of the Excel[®] spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found on the Department's homepage at <http://www.ecy.wa.gov/programs/wq/wastewater/index.html#npdes> spreadsheets.